MODIS DATA SYSTEM STUDY

TEAM PRESENTATION

April 14, 1989

AGENDA

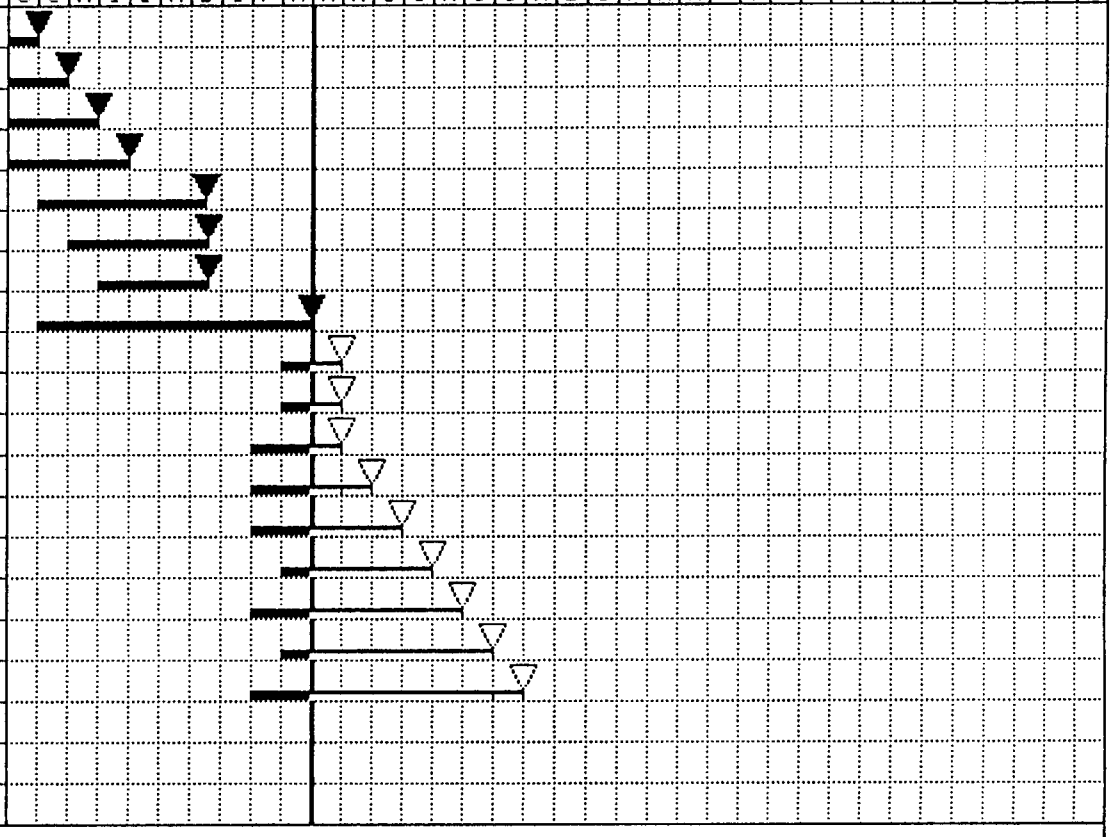
1. Status of the MODIS Data System Study
2. Core MODIS Data Products
3. Measurement Activities Proposed by MODIS Team Members

MODIS DATA SYSTEM STUDY
APPROVAL
ACCOMP.

Summary of Deliverables

ORIG. APPVL. 06/24/88
LAST CHANGE 03/01/89
STATUS AS OF 04/01/89

	MILESTONES
01	WBS Study Plans
02	Prelim User Data Prod Req'ts
03	Preliminary Operations Concept
04	Functional Requirements Doc
05	Prelim Data Processing Plan
06	Prelim System Specification
07	Operations Concept
08	Prelim Data Requirements Doc
09	Non-Advoc'y Rev'w Mat'ls
10	EosDIS/MIDACS I/F Comparison
11	Scenarios for Science Team
12	Prel TM Sci Product Summary
13	Input Data Attributes Report
14	MODIS Data Prod Algorithm Rep
15	TM Product Analysis Report
16	MODIS SDST/ICT Req'ts Doc
17	Data Requirements Doc
18	
19	
20	



Note:

April 14, 1989

CORE MODIS DATA PRODUCTS

1. INTRODUCTION

It is the intention of the MODIS science team to have in place and implemented on the CDHF at NASA/GSFC by launch of NPOP-1 a set of algorithms capable of producing a complete set of "core" MODIS data products. We define the term Core MODIS Data Product as a product that: (a) is of interest to the scientific community, particularly the members of the MODIS science team, other Eos instrument science teams, and the interdisciplinary investigations; (b) would be an important contribution towards meeting the scientific objectives of Eos; (c) can be produced using primarily, though not exclusively, MODIS data; and (d) is sufficiently well understood such that retrieval algorithms already exist or will be fully developed within the next several years using simulated MODIS data.

This list of the core MODIS data products is being developed to fulfill several crucial requirements. First, the list will highlight the importance of the MODIS instrument (both MODIS-N and MODIS-T) when presented as a part of the upcoming nonadvocacy review. Second, the list will ensure that the MODIS instrument adequately supports the requirements of the Eos interdisciplinary investigations, many of which have very specific requirements for MODIS data products. Third, emphasis on the processing, storage, and data requirements for these core MODIS products will provide accurate (initial) sizing estimates to be used in the specification of EosDIS components including the CDHF, DADS, and IMC.

2. RELEVANT ISSUES

The early identification of these core MODIS data products has identified some relevant issues which must be resolved before a final list of the data products, along with a complete set of their attributes, can be completed. The primary objective in resolving these issues is the identification, implementation, and generation of a set of core MODIS data products with the widest possible application and user community.

2.1 Data Product Domains

With its global and spectral coverage and relatively high spatial resolution, the MODIS instrument is a key component of the Eos. The MODIS science team is the largest of any facility instrument, and MODIS data will be used by the majority of the facility, PI, and interdisciplinary investigation teams. However, many of the MODIS science team members have proposed key data products to be produced only over very limited portions of the Earth. As core data products, it will be necessary to consider producing the

MODIS products over expanded (and probably global) domains to satisfy the requirements of the general science community.

2.2 Selection of Standard Algorithms

There are a number of MODIS data products for which two or more members of the MODIS science team have proposed alternative algorithms based on somewhat different, radically different, or even unspecified (at this time) retrieval techniques. To gain wide acceptance by the general scientific community, and to be able to provide a "standard" core MODIS data product, it will be necessary for the MODIS science team to agree on a standard algorithm for each of the core products.

2.3 Compatibility with Requirements of Other Teams

At this time, certain interdisciplinary investigation and instrument teams are requesting calibrated Level-1 MODIS radiance data so that they can, in effect, generate "MODIS data products." In most and perhaps all cases, these alternative products (such as cloud coverage) replicate standard data products to be routinely produced by EosDIS for the MODIS science team. Though coordination with each of the other teams, and an understanding of the other teams' requirements with respect to timeliness, spatial resolution, algorithm compatibility, and other issues, it will be possible to reduce and perhaps eliminate these product redundancies.

2.4 Standard Grids

To optimize the utility of the MODIS data products, not only for the MODIS science team members but for other investigators as well, it is important to define a set of standard grids. These Level-3 grids should be common for many of the core products. There may be requirements to generate MODIS core products at more than one spatial resolution. In the science team members' proposals, there is a wide range of spatial resolutions with little consistency between the investigators.

3. TYPES OF PRODUCTS AND ALGORITHMS

The core MODIS data products and their corresponding algorithms may be allocated into six general areas: (1) Core MODIS "utility" algorithms; (2) Level-1 radiances at the top of the atmosphere and Level-2 radiances at the bottom of the atmosphere; (3) core terrestrial data products; (4) core oceanic data products; (5) core clear-sky data products; and (6) core cloud data products.

4. CORE MODIS "UTILITY" ALGORITHMS

There are a number of algorithms, over and above those required to produce the individual data products, which are essential to the

reduction of the Level-0 MODIS data and the successful generation of higher-level products. These include standard: (1) calibration algorithms; (2) Earth location algorithms; (3) cloud identification algorithms; (4) atmospheric correction algorithms; (5) time and space averaging and rectifying/overlaying algorithms; and (6) display and processing algorithms.

4.1 Calibration Algorithms

Calibration algorithms will include: (1) instrument data monitoring algorithms; (2) analysis of internal calibration data; (3) analysis of instrument models; (4) comparison to in-situ and ground-truth data; (5) comparisons to other Eos and non-Eos instrument data; and (6) assignment of the MODIS calibration coefficients for production.

4.2 Earth Location Algorithms

Earth location algorithms will include: (1) navigation of the IFOV centers to the Earth geoid; (2) interpolation of the Earth locations from a sparse array of anchor points to each IFOV; and (3) a correction for surface topography.

4.3 Cloud Identification Algorithms

For the analysis and retrieval of data products at the Earth's surface, it will be necessary to identify the presence of clouds. In addition to cloud identification algorithms, it may also be necessary to delineate the cloud shadows as well.

4.4 Atmospheric Correction Algorithms

For the analysis and retrieval of data products at the Earth's surface, and particularly for oceanic products which provide only a small contribution to the total radiance signal as measured, it will be necessary to remove the atmospheric "contamination." The sources of contamination to be considered (for clear skies) include: (1) Rayleigh scattering; (2) aerosols; (3) ozone; and (4) total precipitable water.

4.5 Time and Space Averaging Algorithms

Other algorithms will be required to remove the effects of bidirectional anisotropy in the measured radiance field, limb darkening, and the dependence of albedo on solar zenith angle. In addition, standard algorithms averaging product data to standard MODIS grids may be required. It will be necessary to develop algorithms that can overlay observations taken from different viewing angles (side-to-side and fore-to-aft) with varying footprint sizes.

4.6 Display and Processing Algorithms

Display algorithms will include land, ocean, and coastal region overlays, which can be used to extract desired data and to identify regions for a specific type of processing (e.g., generate a product at 1 km resolution for coastal regions, and 4 km for oceanic regions). Other algorithms in the category remain to be identified at this time.

5. CORE (LEVEL-1 AND LEVEL-2) RADIANCE DATA PRODUCTS

MODIS radiances will be taken over 104 different spectral bands spanning the shortwave, near-infrared, medium-infrared, and thermal-infrared spectral regions. The general science community has an interest in both the Level-1 radiances at the top of the atmosphere and the Level-2 radiances at the bottom of the atmosphere. This Eos-wide requirement for MODIS radiances is not fully known at this time, but is presumed to extend over most (if not all) of the spectral bands, include both the top and bottom of the atmosphere, and be for a range of spatial resolutions (from the instrument's IFOV to a variety of Level-3 meshes).

6. CORE TERRESTRIAL DATA PRODUCTS

The core terrestrial MODIS data products can be categorized into those which apply to all terrestrial surfaces (e.g., surface temperature or snowcover) and those which apply to the surface vegetation (e.g., vegetative index or net primary productivity). The candidate core terrestrial MODIS data products identified to date include:

6.1 Surface Emissivity

6.2 Surface Temperature

6.3 Surface Albedo

6.4 Surface Radiation Budget (SW up, SW down, LW up, and LW down)

6.5 Surface Snowcover

6.6 Normalized Difference Vegetative Index

6.7 Polarized Vegetative Index

6.8 Leaf Area Index

6.9 Absorbed Photosynthetically Active Radiation

6.10 Net Photosynthesis

6.11 Net Primary Productivity

6.12 Evapotranspiration

Following the review of these terrestrial core products with the MODIS science team leader, the following revisions are suggested:

1. Of these candidate core products, it is likely that a surface effective blackbody temperature will be generated (the product of 6.1 and 6.2) as a core product.

2. Candidate products 6.3, 6.4, 6.8, 6.9, 6.10, 6.11, and 6.12 may not be generated.

3. Candidates 6.5, 6.6, and 6.7 are likely core products.

4. New candidate core products include:

6.13 Surface Effective Blackbody Temperature

6.14 Weekly/Seasonal Land-Cover (maps)

6.15 "Land-Leaving" Radiances (bidirectional, spectral radiance at the bottom of the atmosphere)

7. CORE OCEANIC DATA PRODUCTS

The core oceanic MODIS data products can be categorized into those which are not directly related to biological activity (e.g., sea surface temperature and suspended sediment) and those which describe the biological activity (e.g., chlorophyll pigment and dissolved organic matter concentration). The candidate core oceanic MODIS data products identified to date include:

7.1 Sea Surface Temperature

7.2 Water-Leaving Radiances; Ocean Color (see Section 5 above)

7.3 Suspended Sediment Concentration

7.4 Chlorophyll Pigment Concentration

7.5 Phycoerythrin Pigment Concentration

7.6 Phycocyanin Pigment Concentration

7.7 Gelbstoffe Concentration

7.8 Detached Cocolith Concentration

7.9 Primary Productivity

7.10 Dissolved Organic Matter

7.11 Case II Waters Dissolved Marine Humus

7.12 Case II Waters Suspended Detritus

Following the review of these oceanic core products with the MODIS science team leader, the following revisions are suggested:

1. Candidate products 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, and 7.12 may be generated if the team members strongly advocate them.

2. Candidates 7.1, and 7.2 are likely core products.

3. New candidate core products include:

7.13 Sea-Ice Coverage

8. CORE CLEAR-SKY DATA PRODUCTS

The core atmospheric MODIS data products can be divided into clear-sky and cloud products. The core clear-sky MODIS data products, in turn, can be categorized into those which apply to aerosols (e.g., single scattering albedo and optical depth) and those which do not apply to aerosols (e.g., degree of polarization and Rayleigh scattering). The candidate core clear-sky MODIS data products identified to date include:

8.1 Aerosol Single Scattering Albedo/Radiance

8.2 Aerosol Optical Depth

8.3 Aerosol Mass Loading

8.4 Aerosol Size Distribution

8.5 Polarization Over Oceans

8.6 Rayleigh Scattering Radiance

Following the review of these clear-sky core products with the MODIS science team leader, the following revisions are suggested:

1. Candidate product 8.6 may not be generated.

2. Candidates 8.1, 8.2, 8.3, 8.4, and 8.5 are likely core products.

3. No new candidate core products exist at this time.

9. CORE CLOUD DATA PRODUCTS.

The candidate core MODIS cloud data products identified to date include:

9.1 Cloud Emissivity

9.2 Cloud Fractional Area

9.3 Cloud Optical Depth

9.4 Cloud Type

9.5 Cloud Area and Perimeter

9.6 Cloud Albedo/Brightness

9.7 Cloud-Water Thermodynamic Phase

9.8 Cloud-Droplet Effective Radius

9.9 Cloud-Top Pressure

9.10 Cloud-Top Temperature

9.11 Cloud-Radiative Forcing

Following the review of these cloud core products with the MODIS science team leader, the following revisions are suggested:

1. Candidate product 9.1, 9.3, 9.4, and 9.11 may not be generated.

2. Candidates 9.2, 9.5, 9.6, 9.7, 9.8, 9.9, and 9.10 are likely core products.

3. No new candidate core products exist at this time.

10. ACTION ITEMS

10.1 Develop a table of core products stating proposed algorithms and proposing investigator(s). Consider mechanisms for developing trade-offs for identifying "standard" MODIS team algorithms from proposed alternatives.

10.2 Concisely list the MODIS team members (and other parties) strongly interested in the calibration of MODIS.

10.3 Provide a table relating core product, proposing investigator, and proposed grid resolutions (for the Level-3 core products).

10.4 Work with Jim Heirtzler to identify anticipated digital elevation data sets and sources for the MODIS Level-1 IFOV navigation.

10.5 Review the requirements of the Eos interdisciplinary investigations to ensure that MODIS meets them; begin discussions with the PI's for the investigations to converge to a common understanding of the role of the core MODIS data products.

#1 CLOUD IMAGERY, COVER, TYPE, HEIGHT

DATA REQUIREMENT	MEASUREMENT TECHNIQUE	RATIONALE	CANDIDATE ALGORITHM	RATIONALE	INSTRUMENT REQUIREMENTS
Imagery	A) VIS/IR Radiometry 1) Single Band 2) Multi-Band B) Passive microwave 1) Single Band 2) Multi-Band C) Active Microwave 1) Single Band 2) Multi-Band D) Lidar 1)VIA 2)IR	A) 1) Day/nite, all cloud types A) 2) Cloud discrimination from background B) Selected attenuation by ice or dense liquid water C) $Z \cong \Upsilon^4$ selective by drop size and liquid water, gating for discrimination** D) Backscatter, β scat, thin cloud detection, gating for discrtimination***	A) • Enhancement methods • Physical and geomeric rectification • Cloud/background discrimination B) • Same as A)	A) Delinate special features B) Common Perspective	A) 1).4-1.1 μm /10-11 μm A) 2).4-.7, .7-.9,1.4-1.6, 3.9-4.0 8.6-9.0, 10.0-11.5, 11.8-12.2 NEΔT and NEΔPAN required (A) on-board cal as required (B) IFOV to match ground resolution (C) match field of regard with altitude to limit perspective requirements (D)' B) 205,150 GHZ (85,37 support notes A), B), C), D) Priority A), B)
Cover	A) VIS/IR Radiometry 1) Single Band 2) Multi-Band Passive microwave B) 1) Single Band 2) Multi-Band C) Active Microwave 1) Single Band 2) Multi-Band D) LIDAR 1) VIS 2) IR	A) 1) Day/nite, all cloud types A) 2) Cloud discrimination from background B) Selected attenuation by ice or dense liquid water C) $Z \cong \Upsilon^4$ selective by drop size and liquid water gating for discrimination*** D) Backscatter, β scat, thin cloud detection gating for discrtimination***	A) • Cloud/background discrimination - Space variance - Time variance • Multi-spectral co-variance* B) • D-Matrix methods	A) Variety of this type have been tested	A) Same as above notes A), B), C), D) Priority A)
Type	A) VIS/IR Radiometry A) & B)	A) Texture, Υ ($\nearrow$) A) & B) Optical thickness and scattering	A) Classification methods including discriminant variables in space/time/spectral domain A&B) Same	A) Determines modal radius A&B) Can be based on "ground truth"	A) Same as above plus 8.6 - 9.0 μm Notes A), B), C), D). A) & B) Same as A) & B) above Notes A), B), C), D)
Height Thickness Bases	A) VIS/IR Radiometry B) Passive microwave C) Active Microwave D) Lidar E) Profiler Info	A) IR → T (z), stereo, differential absorption emission B) Possible thickness C) Gate for tops & bases D) Gate for tops (bases for thin clouds only) E) Use of sounder information	A) Stereo: photogrammetric T(Z): table look-up, linear combo Diff: table look-up, linear combo B) D-Matrix for base estimate C) Range gating attraction D) Lidar equation E)	A) Same as A) above plus 13.9-14.1 μm plus 10 bit VIS B) Same as A) & B) C) 6 GHz Radar D) 10.6 or μm Lidar; 10Hz rep.; now-contiguous stepscan	Priority A) & B), A)

* Needs Explanation
** Area Coverage And Resolution Concerns
*** 1993 Technology not available; optics and pointing concerns

Priority D) & A), C) & A) B) & A), A)

#5 PRECIPITATION

DATA REQUIREMENT	MEASUREMENT TECHNIQUE	RATIONALE	CANDIDATE ALGORITHM	RATIONALE	INSTRUMENT REQUIREMENTS
ΔX = 25km Accuracy: 5mm/hr Precision: 2.5mm/ur	A) Combined VIS/IR (area-time-integral)	A) Life-cycle of clouds relationship to rainfall amounts; uses cloud model	A) Statistical	A) Need high quality matching radar data sets (ground based) for tests; data intensive	A) VIS/IR sat data with high temporal resolution radar data for comparison
	B) Passive Microwave				
	B1) Over land (scattering method)	B1) Scattering of MW due to precip. ice associated with convective activity	B1) No quantiative results yet. Most likely a statistical method or combination (stat/iter)	B1) Need high quality matching radar data sets (ground based) for tests	B1) Freq - >70 GHz H & V polarizations; high time freq. GEO data
	B2) Over ocean (hybrid scattering emission method)	B2) Scattering and attenuation of MW radiation by particles	B2) No quantiative results yet. Most likely a statistical method or combination (stat/iter)	B2) Need high quality matching radar data sets (ground based) for tests	B2) Freq - 10-85 GHz H & V polarizations (need 10 GHz for higher rain rates)
	B3) Over ocean/ (emission method)	B3) Absorption of NW due to liquid precip.	B3) Statistical/ inerative	B3) Need high quality matching radar data sets (ground based) for tests	B3) Freq - < 37 GHz
	C) Radar (single or multi-band) (dual polarization)	C) Basckscatter due to precipitation sized particles; better for rain rate variance	C) Marshall-palmer relationship or other size distrib.	C) Need high quality matching radar data sets (ground based) for tests; polarizxation obtaines better precip variance; multi-band covers light to heavy rates	C) L,S,C,X bands (0.4 - 11 GHz) Priority: B

#6 VISIBILITY (AEROSOL CONC.)

DATA REQUIREMENT	MEASUREMENT TECHNIQUE	RATIONALE	CANDIDATE ALGORITHM	RATIONALE	INSTRUMENT REQUIREMENTS
A) To I.D. regions of CLEAR vertical and slant VIS. (ΔX = 0.65 XM)	A) VIS and NEAR IR Scattered Spectral Radiance	A) Has been demonstrated; aerosol optical depth affects backscattered light; wavelength ratios remove upper atmosphere portion	A) Work at PIXEL level linear or exponential relations; radiance ratios; need good spectral albedo of background	A) Algorithms have been tested with aircraft experiments	A) 2 or 3 channels (0.6, 1.0, 1.6μm) high sensitivity (X $MWCM^{-2}$ $Sr^{-1}\mu^{-1}$) and $\geq$ 10 bit output
B) To measure (best effort) total atmospheric aerosol conc.	B) Spectal Reflectance or emittance in THERMAL IR	B) In research domain	B) Compares theory and observations; iterative solution; need concurrent water vapor data	B) Tests of methods needed	B) Technique too primitive

Priority A

#18 SEA ICE

DATA REQUIREMENT	MEASUREMENT TECHNIQUE	RATIONALE	CANDIDATE ALGORITHM	RATIONALE	INSTRUMENT REQUIREMENTS

	A) VIS/IR Imagers	A)	A) • Pre-process for Cloud Discrimination
			  * Termperture threshold
			  * Ratio Bands
			• Automated change detection (i.e., ice edge discrimination)
			• Edge enhancements
				A)	A) VIS/IR Imager: .4-1.1, 1.4 -1.6, 3.9-4.0, 10.0-11.5, 11.8-12.2

	B) Passive Microwave (18, 37, 90 GHz)	B)	B) • D-matrix of 3 Gregs, 2 polarization to discriminate between ice/water and estimate ice age • Edge enhancements	B)	B) 18, 37, 90 GHx - V&H polarization
	C) Radar (SAR)	C)	C) • On-board change detection to reduce data rates (Tac Sites) • Full image on demand • Range Gate • Discriminate between different reflective surfaces (ice-water) - texture	C)	C) L-Band - Course resolution for wide width - High resolution for detecting leads, polynyas, icebergs L or C band
	D) Radar (Real Aperture)	D)	D) • Range gate • Texture analysis	D)	D) Similar to GEOSAT or TOPEX (13 GHz)
	E) Radar (Altimeter)	E)	E) • Analyze shape of return pulse (sea-ice discrimination) • Precise range gate	E)	E)
	F) LIDAR	F)	F) • Cloud discriminator • Precise rnage gate • Return pulse analysis	F)	F)
	G) Hi-Res MSI	G)	G) • Cloud discrimator • Band ratios/combinations • Principal components analysis • Automated change detection • Line enhnacements	G)	G)

MEASUREMENT ACTIVITIES AND FIELD EXPERIMENTS

I. DEFINITION OF TERMS

We define the term "field experiment" to mean: 1) any in-situ measurements which will be used for MODIS validation, algorithm development, or data product generation (whether or not MODIS team members are directly involved in the data collection); 2) measurement activities conducted by MODIS science team members. We define the term "measurement activities" as those projects conducted by the team members requiring MODIS data products at the measurement site.

II. MODIS FIELD EXPERIMENT IDENTIFICATION CODE

Experiment Category:

C Calibration
O Ocean
L Land
A Atmosphere

Sequential Identification Number:

01-99

Primary Purpose of Experiment:

A Algorithm Development
D Data Product Generation
V Validation or Verification

Measurement Activities Proposed by Modis Team Members

Team Member	Purpose	Quantities Measured	Location	Method	Schedule	Impacts
Running L12V	Algorithm Development & Validation Terrestrial Productivity	Leaf Area Index Primary Production Soil properties Stream flow Surface weather	6 Field Stations Probably NSF Sites	In-situ Readings taken hourly, daily, weekly, or annually as appropriate.	Begin in 1991 Till After Launch	A small amount of data to be archived
Strahler A10V	Algorithm Development & Validation Land Surface Radiation	Spectral and directional (ir)radiance. Plant canopy structure.	6-10 TBD field sites.	In-situ readings + Airborne Radiometer + High-altitude Photographs.	TBD	A small amount of data to be archived.
Menzel A07A A08V	Algorithm Development & Verification Cloud Parameters Evaluate proposed CO^2 channels	High resolution both Spatial and Spectral Cloud imagery, Temperature, moisture	TBD After launch Data taken on underflights	Use of MAMS[1], HIS^2 on a NASA ER-2 aircraft	1989 till After launch	Investigator wishes to use results in final design of MODIS-N Requires ER-2 flights.
Vanderbilt L13A	Determine the Polarization of light scattered by plants	Polarized spectra of scattered light	Investigators laboratory	Benchtop measurements	Pre-launch	Very slight
Vanderbilt	Algorithm Development & Verification Polarized Scattering of Plant canopies	Angular Dependence of Incoming & Scattered Polarized Spectra Canopy Characteristics	Selected Field sites	Polarized Spectrometer In-situ Measurements	Pre- and Post-launch	There will be a TBD volume for archiving
Vanderbilt	Algorithm Development & Verification Atmospheric Polarization Effects	Polarized Spectral Images	Simultaneous C-130 and ER2 aircraft over field sites	Specially Built Instruments to Mimic the Polarized MODIS Channels	Pre- and Post-launch	NASA aircraft required Hardware Development Data Archiving

Slater C01V	Calibration	Precise Characterization of Calibration sources	Contractors Calibration Laboratory	Specially Developed High-precision Portable Radiometer	Pre-launch	Small data Volume for Archiving
Slater	Calibration Verification	Spectral Reflectance Atmospheric Parameters over Calibration Sites	Calibration Ground Sites + Over-flights	Portable Radiometer + Radiosondes	Post-launch Simultaneous with Calibration Observations	Significant Calibration Studies Radiometer Development Data for Archiving
Kaufman A04V	Validation of Aerosol Algorithms Atmospheric Optical Depth	Transmitted and Scattered Solar Radiation on the Ground	TBD	Sunphotometer /Radiometer	Post-Launch	A Small Amount of Data for Archiving
Hoge O21V	Algorithm Development & Validation Chlorophyll	Chlorophyll Phyrocrythrin Phycocyanin	mid-Atlantic Bight Test Area	Aircraft based AOL^3 & Spectro- radiometer	Pre- and Post-Launch	Laser Development Ship Cruises Data archive
Muller L11A	Measure Scattering Characteristics of Soils & Plant Canopies	Surface and Plant Characteristics Spectra of Scattered Radiation	TBD large homogeneous land tracts	In-situ and Lab scattering Measurements Photographs from Ground and Aircraft	TBD mostly Pre-launch	A Small Amount of Data for Archiving
Clark O19V	Ground-truth Measurements of Ocean Surface	Downwelling Spectral Irradiance Upwelling Spectral Radiance	3 Moored and 8 drifting Buoys + Ship Cruises	Specially Designed Optical System Data Passed via Satellite link	Pre- and Post-launch	Satellite data link required A small but significant data volume to archive

Carder 018V	Algorithm Development & Validation for Ocean Surface Properties	Downwelling Spectral Irradiance Upwelling Spectral Radiance Near-surface Absorption properties	TBD Ships of Opportunity Atlantic Gulf of Mexico	In-situ use of high-resolution spectral (ir)radiometer + absorption meter	Continuation of Work in Progress till after Launch	A Small Amount of Data for Archiving
Barton 016V	Algorithm Development & Validation for Sea Surface Temperature	Sea Surface Temperature	TBD	TBD Radiometers(?)	Pre- and Post-launch	A Small Amount of Data for Archiving
Wan L14A	Algorithm Development & Validation for Land Surface Temperature	Land Surface Temperature Surface Characteristics	TBD Within China	Thermal Infrared Spectrometer (JPL) In-situ Readings	Begin in 1995	A Small Amount of Data for Archiving
King A09V	Validation of Cloud Properties	Cloud Micro-physics Reflected and Transmitted Solar Radiation	TBD (unimportant)	Radiometers & Microphysics Probes on a C-131A aircraft in Clouds	Continuation of Current Research till Post-launch	A TBD Amount of Data for Archiving
King	Validation of Aerosols	Spectra and Polarization of Skylight	TBD	Spectral Polarimeter being developed at GSFC	Post-Launch	A Small Amount of Data for Archiving
Parslow 020V	Algorithm Development & Validation of Ocean Color & Water Properties	Water Leaving Radiances Biological, Chemical, Physical Characteristics of Ocean Waters	Australian Waters	Airborne OCS[4] Ship Measurements Laboratory Study of Absorption and Scattering	Continuation of Current Research till Post-Launch	A TBD Amount of Data for Archiving
Tanre A03A	Validation Aerosols Vegetation	Aerosols Radiative Properties of Vegetation	TBD	TBD	Post-launch(?)	TBD Data for Archive

Huete[5]	Conceptual Development + Algorithm Development & Validation for Soil Types	Reflected Radiation Organic Matter and Detritus	TBD Over a wide Range of Soil Surface Types Arizona and New Mexico	Radiometer on an Aircraft Analysis of Surface Samples	TBD Pre- and Post-launch	A Small Amount of Data for Archiving

1. MAMS = Multispectral Atmospheric Mapping Sensor

2. HIS = High resolution Interferometric Sounder

3. AOL = Airborne Oceanographic Lidar

4. OCS = Ocean Color Scanner

5. Observations to be done by Cooperating Investigator R. D. Jackson

FIELD EXPERIMENT SUMMARY (ID NUMBER)

01) Reflectance-based Calibration Experiment I (C01V)
02) Reflectance-based Calibration Experiment II (C02V)
03) Aerosol Properties Experiment I (A03A)
04) Aerosol Properties Experiment II (A04V)
05) Conventional Atmospheric Data Collection Experiment I (A05D)
06) Conventional Atmospheric Data Collection Experiment II (O06D)
07) Cloud Parameter Algorithm Development Experiment (A07A)
08) Cloud Parameter Validation Experiment I (A08V)
09) Cloud Parameter Validation Experiment II (A09V)
10) Vegetation Canopy Geometry and Atmospheric Transmission Experiment (A10V)
11) Vegetation Canopy Geometry and Soil Surface Roughness Experiment (L11A)
12) NSF Long-Term Ecological Research Sites Experiment (L12V)
13) Stokes Polarimeter Experiment (L13A)
14) Land Surface Radiance and Temperature Experiment (L14A)
15) Surface Insolation Measurements for Snowcover Derivation Experiments (L15V)
16) Ground-truth SST Experiments (O16V)
17) ARGOS Drifting Buoy SST Observations (O17V)
18) Ship of Opportunity SST Observations (O18V)
19) Optical Buoy Experiment (O19V)
20) Australian Waters Ground-truth Data (O20V)
21) NASA Airborne Oceanographic Lidar (AOL) Experiment (O21V)
22) U.S Global Ocean Flux Study (GOFS) and JGOFS Survey (O22V)
23) California Current System Experiment (O23V)

FIELD EXPERIMENT FACTSHEET (C01V)

FIELD EXPERIMENT NAME: Reflectance-based Calibration Experiment I (C01V)

PURPOSE: Use in-situ radiation measurements and accurate radiative transfer codes to predict satellite altitude radiance values so instruments can be calibrated.

PROPOSER: Dr. Philip N. Slater

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Calibration/radiative transfer

GROUND-TRUTH INSTRUMENTS USED:

1) U-2 overflights with radiometers.
2) Barometric pressure.
3) Total precipitable water from radiosondes, relative humidity at surface, and temperature measurements.
4) Spectral optical depth from portable spectroradiometers at about 1500 locations.
5) Helicopter low level flights

LOCATION(S): White Sands, NM; Edwards AFB, CA.

TIME(S): About three times per year when MODIS, Landsat, SPOT, AVHRR, AIS, AVIRIS, and other remote sensors can sample the site nearly simultaneously.

MODIS DATA PRODUCTS REQUIRED: Level 1A counts data.

TIMELINESS REQUIREMENTS: TBD (probably several days later is adequate since considerable data collection is required and several weeks of analysis may be required).

COMMUNICATION REQUIREMENTS: None

SPECIAL MODIS-T OPERATION MODE(?): Yes: Probably in stare mode.

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:

Collaborative effort with Salomonson is possible.

Dr. Kaufman also plans to use desert sites as calibration targets.

FIELD EXPERIMENT FACTSHEET (C02V)

FIELD EXPERIMENT NAME: Reflectance-based Calibration Experiment II (C02V)

PURPOSE: Use in-situ radiation measurements and accurate radiative transfer codes to predict satellite altitude radiance values so instruments can be calibrated.

PROPOSER: Dr. Vincent V. Salomonson

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch.

SCIENTIFIC DISCIPLINE(S): Calibration

GROUND-TRUTH INSTRUMENTS USED:
1) PARABOLA instrument
2) Pyranometers
3) Multi-spectral radiometers such as Barnes MMR instrument

LOCATION(S): Whites Sands, NM; Rogers Dry Lake.

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: TBD

TIMELINESS REQUIREMENTS: None

COMMUNICATION REQUIREMENTS: None

SPECIAL MODIS-T OPERATION MODE(?): Yes: May be in stare mode.

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:
Collaborative effort with Slater is possible.
Dr. Kaufman also plans to use desert sites as calibration targets.

FIELD EXPERIMENT FACTSHEET (A03A)

FIELD EXPERIMENT NAME: Aerosol Properties Experiment I (A03A)

PURPOSE: About ground-based radiative measurements and using radiative transfer codes, relate the measurements to the satellite measurements. Also use these and other earlier measurements for algorithm development.

PROPOSER: Dr. D. Tanre

PRE-LAUNCH OR POST-LAUNCH(?): Both

SCIENTIFIC DISCIPLINE(S): Atmosphere/aerosols

GROUND-TRUTH INSTRUMENTS USED:
1) Sunphotometers
2) Pyrheliometers and pyranometers
3) Others TBD

LOCATION(S): TBD (similar experiment was performed in Africa in 1986 and 1987.

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED:
1) Aerosol Optical Depth over Deserts
2) Aerosol Size Distribution over Deserts
3) Aerosol Absorption over Deserts
4) Perhaps others if ground-truth experiment is not in a desert region.

TIMELINESS REQUIREMENTS: TBD

COMMUNICATION REQUIREMENTS: TBD

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data to DADS.

ADDITIONAL COMMENTS:
Proposal is lacking in details of experiment. See Tanre et al., 1988. Radiative properties of desert aerosols by optical ground based measurements at solar wavelenghts. JGR (to be published).
See Kaufman's Aerosol Properties Experiment II.
See Strahler's Vegetation Canopy Geometry and Atmospheric Transmission Experiment.

FIELD EXPERIMENT FACTSHEET (A04V)

FIELD EXPERIMENT NAME: Aerosol Properties Experiment II (A04V)

PURPOSE: Provide ground measurements of aerosol optical depth and aerosol size distribution for comparison to MODIS derived values.

PROPOSER: Dr. Yoram J. Kaufman

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Atmsophere/aerosols

GROUND-TRUTH INSTRUMENTS USED:
1) Combined sunphotometer-radiometer

LOCATION(S): TBD

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED:
1) Aerosol Optical Depth
2) Aerosol Size Distribution
3) Aerosol Absorption

TIMELINESS REQUIREMENTS: TBD

COMMUNICATION REQUIREMENTS: TBD

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data to DADS.

ADDITIONAL COMMENTS:
Few details are provided in the proposal on this experiment.
See Tanre's Aerosol Properties Experiment I.
See Strahler's Vegetation Canopy Geometry and Atmospheric Transmission Experiment.

FIELD EXPERIMENT FACTSHEET (A05D)

FIELD EXPERIMENT NAME: Conventional Atmospheric Data Collection Experiment I (A05D)

PURPOSE: Collect conventional weather observations and blend them with MODIS data used to generate a first guess forecast. Satellite soundings (e.g., AIRS) will also be validated and calibrated.

PROPOSER: Dr. Joel Susskind

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Atmosphere/clouds

GROUND-TRUTH INSTRUMENTS USED:

1) Radiosondes
2) Ship observations
3) Aircraft observations
4) Conventional surface pressure observations
5) Conventional surface temperature observations
6) Conventional surface wind observations
7) Conventional surface humidity or moisture observations
8) Others TBD

LOCATION(S): Global meteorological network

TIME(S): Launch date (Dec., 1996) onwards.

MODIS DATA PRODUCTS REQUIRED: None

TIMELINESS REQUIREMENTS: Real time or near-real-time.

COMMUNICATION REQUIREMENTS: TBD

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: Major impact; data fields must be put in a standard MODIS format soon after receipt, particularly if forecasts are a major objective.

ADDITIONAL COMMENTS:

Dr. Evans and Dr. Gordon also want the global atmospheric pressure, but want it sent to their TMCF's rather than CDHF as is the case here.

FIELD EXPERIMENT FACTSHEET (O06D)

FIELD EXPERIMENT NAME: Conventional Atmospheric Data Collection Experiment II (O06D)

PURPOSE: Conventional barometric surface pressure measurements are required for accurate derivations of water leaving radiances.

PROPOSER: Dr. Robert H. Evans; Dr. Howard R. Gordon

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Oceans/physical

GROUND-TRUTH INSTRUMENTS USED: NOAA/Navy barometric data sets.

LOCATION(S): Global

TIME(S): Continuously acquired

MODIS DATA PRODUCTS REQUIRED: None

TIMELINESS REQUIREMENTS: Must enter CDHF processing to calculate water leaving radiances. A MODIS compatible format is required, although CDHF will probably put the acquired data in the proper format.

COMMUNICATION REQUIREMENTS: Preferably a TBD bps line from NOAA/Navy facilities to CDHF.

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: Depending on NOAA/Navy procedures, EosDIS timeliness requirements may or may not be met for some MODIS data products; the MODIS DADS must have a copy of this data set for data traceability and possible re-processing.

ADDITIONAL COMMENTS:
See the Conventional Atmospheric Data Collection Experiement I conducted by Dr. Susskind.

FIELD EXPERIMENT FACTSHEET (A07A)

FIELD EXPERIMENT NAME: Cloud Parameter Algorithm Development Experiment (A07A)

PURPOSE: In-situ measurements of cloud extent, cloud type, cloud top pressure, and cloud emissivity used in MODIS-N algorithm development.

PROPOSER: Dr. W. Paul Menzel

PRE-LAUNCH OR POST-LAUNCH(?): Pre-launch

SCIENTIFIC DISCIPLINE(S): Atmosphere/clouds

GROUND-TRUTH INSTRUMENTS USED: MAMS (Multispectral Atmospheric Mapping Sensor) on aircraft flights.

LOCATION(S): TBD

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: None (pre-launch experiment)

TIMELINESS REQUIREMENTS: None

COMMUNICATION REQUIREMENTS: None

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:

FIELD EXPERIMENT FACTSHEET (A08V)

FIELD EXPERIMENT NAME: Cloud Parameter Validation Experiment I (A08V)

PURPOSE: In-situ measurements of cloud extent, cloud type, cloud top pressure, and cloud emissivity used to validate the same cloud parameters derived by MODIS-N.

PROPOSER: Dr. W. Paul Menzel

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Atmosphere/clouds

GROUND-TRUTH INSTRUMENTS USED:

1) MAMS (Multispectral Atmospheric Mapping Sensor) on aircraft flights.
2) HIS (High Resolution Interferometer Sounder) on aircraft flights.

LOCATION(S): TBD

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: Three Day Mean Cloud Extent
Three Day Mean Cloud Extent by Type
Three day Mean Cloud Emissivity
Three Day Mean Cloud Top Pressure
Instantaneous values of above parameters (?)

TIMELINESS REQUIREMENTS: TBD

COMMUNICATION REQUIREMENTS: TBD

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data sets to DADS. If real-time MODIS cloud parameters are required, MIDACS operations will be affected.

ADDITIONAL COMMENTS: It would appear that although three day means of various cloud parameters are the standard data products, for this experiment these quantities with higher temporal resolution are required, perhaps for each overpass of the satellite.

FIELD EXPERIMENT FACTSHEET (A09V)

FIELD EXPERIMENT NAME: Cloud Parameter Validation Experiment II (A09V)

PURPOSE: Use airborne in-situ measurements of cloud parameters, such as cloud optical thickness, effective particle radius, and spectral single scattering albedo, to compare to MODIS-N derivations of same parameters.

PROPOSER: Dr. Michael D. King

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Atmosphere/clouds

GROUND-TRUTH INSTRUMENTS USED: C131-A aircraft with in-situ microphysics instruments and cloud absorption radiometer.

LOCATION(S): TBD

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: Daytime Cloud Thermodynamic Phase
Daytime Cloud Optical Thickness
Daytime Cloud Effective Particle Radius

TIMELINESS REQUIREMENTS: TBD (probably not near-real-time)

COMMUNICATION REQUIREMENTS: TBD (send MODIS-N image data to TMCF)

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:

FIELD EXPERIMENT FACTSHEET (A10V)

FIELD EXPERIMENT NAME: Vegetation Canopy Geometry and Atmospheric Transmission Experiment (A10V)

PURPOSE: Collect ground-truth data to check satellite derivations of BDRF's, directional radiance at the surface, and spectral irradiance at the surface. Couple these measurements with radiative transfer models to predict the satellite observations of the similar quantities and compare the measured and theoretical results.

PROPOSER: Dr. Alan H. Strahler

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Atmosphere/radiative transfer; Land/biological

GROUND-TRUTH INSTRUMENTS USED:

1) Handheld sunphotometers
2) Directional radiance measurements (PARABOLA or SE 590 are candidate instruments)
3) Irradiance measurements (pyrheliometers and pyranometers)
4) Canopy structure parameters (method not specified)
   Note: See Stokes Polarimeter Experiment by Vanderbilt
5) Leaf Area Index (LAI) (hemispheric photos)
6) Leaf Area Density (LAD) (hemispheric photos)
7) Biomass estimators (method not specified)
8) Other parameters TBD

LOCATION(S): Five to eight test sites with large, uniform surface covers that represent a range of global types will be selected prior to launch. International collaboration will be used as needed.

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED:

1) Production Mode Spectral Directional Radiance
2) Production Mode Spectral Surface Radiance
3) Bi-directional Reflectance Distribution Function (BDRF)
4) Canopy Structure (not yet a MODIS data product; but see Muller's Tree Canopy Area as a candidate data product)

TIMELINESS REQUIREMENTS: TBD (probably need MODIS data only several days later, since ground truth measurements use photographs and sunphotometers, etc. which imply considerable delay before a validation study is actually started.

COMMUNICATION REQUIREMENTS: None

SPECIAL MODIS-T OPERATION MODE(?): TBD

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.
ADDITIONAL COMMENTS: See Muller.

FIELD EXPERIMENT FACTSHEET (L11A)

FIELD EXPERIMENT NAME: Vegetation Canopy Geometry and Soil Surface Roughness Experiment (L11A)

PURPOSE: Provide ground-truth data used to model the potential signals that the MODIS instruments will measure.

PROPOSER: Dr. Jan-Peter Muller

PRE-LAUNCH OR POST-LAUNCH(?): Both

SCIENTIFIC DISCIPLINE(S): Land/biological/physical

GROUND-TRUTH INSTRUMENTS USED:

1) Vertical, ground-level photographs
2) Close range stereo photographs
3) Upward pointing, vertical photographs with fish-eye lens
4) Stereo aerial photographs
5) Field spectroradiometers with theodolites
6) Laboratory spectroradiometers
7) Pyrheliometers and pyranometers

LOCATION(S): TBD; Large homogeneous tracks of land (see Strahler for similar requirement); Some soil samples from the southwestern US will be examined in the laboratory; Indonesia, Brazil, Tanzania, and Malaysia are potential sites.

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: None

TIMELINESS REQUIREMENTS: None

COMMUNICATION REQUIREMENTS: None

SPECIAL MODIS-T OPERATION MODE(?): May want MODIS-T to take stereo images.

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:

The following parameters will be measured: 1) Percentage vegetative cover, 2) canopy height and growth stage, 3) soil type and color, 4) soil surface roughness, 5) plant canopy architecture, 6) leaf inclination as function of time of day, 7) inter-tree spacing, 8) inter-node branch lengths, 9) branch length and orientation angles, 10) canopy closure, 11) tree canopy geometry, 12) soil spectral reflectance, and 13) SBDRF.

See Strahler's Vegetation Canopy Geometry and Atmospheric Transmission Experiment.

FIELD EXPERIMENT FACTSHEET (L12V)

FIELD EXPERIMENT NAME: NSF Long-Term Ecological Research Sites Experiment (L12V)

PURPOSE: Use established sites to acquire biological data which can be used to understand the MODIS Normalized Difference Vegetative Index (NDVI) and other MODIS land biological parameters.

PROPOSER: Dr. Stephen W. Running

PRE-LAUNCH OR POST-LAUNCH(?): Both

SCIENTIFIC DISCIPLINE(S): Land/biological

GROUND-TRUTH INSTRUMENTS USED:

1) Daily meteorological data (incoming shortwave radiation, maximum-minimum air temperature, dewpoint, and precipitation).
2) Weekly stream discharge data.
3) Definition of soil water holding capacity.
4) Weekly or monthly soil moisture at gauged watersheds.
5) Biweekly Leaf Area Indices.
6) Weekly composited AVHRR LAC data.
7) Weekly snowcover estimate in spring-fall.

LOCATION(S):

1) Coweeta Hydologic Stn. in North Carolina.
2) HJ Andrews Exp. Forest in Oregon.
3) Lubrecht Exp. Forest in Montana.
4) Konza Prairie (FIFE experiment site).
5) Jornada (desert site)
6) Tropical site TBD
7) Tundra site TBD

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED:

1) MODIS NDVI
2) Daily Net Photosynthesis Values
3) Daily Evapotranspiration Values
4) MODIS Land Surface Temperatures
5) MODIS-N NDVI

TIMELINESS REQUIREMENTS: TBD

COMMUNICATION REQUIREMENTS: TBD

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:

Will also get maps of canopy carbon conversion efficiencies, canopy or surface resistance factors, and canopy water conversion efficiencies for input to routine generation of MODIS data.

FIELD EXPERIMENT FACTSHEET (L13A)

FIELD EXPERIMENT NAME: Stokes Polarimeter Experiment (L13A)

PURPOSE: Measure Stokes spectral polarization properties over different canopies to aid in derivation of polarized vegetation indices. Relate the polarized vegetation indices to green foliar biomass, photosynthetic capacity, net primary productivity, and carbon flux of the canopies. Also relate the Stokes vectors of individual leaves to plant species, plant development phase, leaf age, and leaf relative water content.

PROPOSER: Dr. Vern C. Vanderbilt

PRE-LAUNCH OR POST-LAUNCH(?): Pre-launch

SCIENTIFIC DISCIPLINE(S): Land/biological

GROUND-TRUTH INSTRUMENTS USED: Stokes Polarimeter and supporting laboratory equipment.

LOCATION(S): TBD

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: None

TIMELINESS REQUIREMENTS: None

COMMUNICATION REQUIREMENTS: None

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS: See Strahler's Vegetation Canopy Geometry and Atmospheric Transmission Experiment. Both experiments require the selection of sites with uniform canopies and thus coordination may be desirable.

FIELD EXPERIMENT FACTSHEET (L14A)

FIELD EXPERIMENT NAME: Land Surface Radiance and Temperature Experiment (L14A)

PURPOSE: To evaluate the algorithms used to derive surface temperatures over land, some ground-truth data of upwelling thermal radiance and surface temperatures are required.

PROPOSER: Dr. Zhengming Wan

PRE-LAUNCH OR POST-LAUNCH(?): Pre-launch

SCIENTIFIC DISCIPLINE(S): Land/physical

GROUND-TRUTH INSTRUMENTS USED: JPL portable thermal infrared spectrometer; surface thermometers

LOCATION(S): China

TIME(S): TBD (several months)

MODIS DATA PRODUCTS REQUIRED: None

TIMELINESS REQUIREMENTS: None

COMMUNICATION REQUIREMENTS: None

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:

FIELD EXPERIMENT FACTSHEET (L15V)

FIELD EXPERIMENT NAME: Surface Insolation Measurements for Snowcover Derivation Experiments (L15V)

PURPOSE: Check various components of the radiation budget in snow-covered regions and compare to MODIS derived values of same quantities.

PROPOSER: Dr. Vincent V. Salomonson

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch for two years.

SCIENTIFIC DISCIPLINE(S): Land/physical

GROUND-TRUTH INSTRUMENTS USED:

1) PARABOLA instrument
2) Pyranometers
3) Multi-spectral radiometers such as Barnes MMR instrument

LOCATION(S): TBD

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: TBD

TIMELINESS REQUIREMENTS: None

COMMUNICATION REQUIREMENTS: None

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:

FIELD EXPERIMENT FACTSHEET (O16V)

FIELD EXPERIMENT NAME: Ground-truth SST Experiments (O16V)

PURPOSE: Provide in-situ observations of sea surface temperatures (generally from ship observations) to compare to MODIS-N SST's.

PROPOSER: Dr. Ian J. Barton

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Oceans/physical

GROUND-TRUTH INSTRUMENTS USED: TBD

LOCATION(S): TBD

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED:

1) Fast Delivery SST's
2) MODIS-N Sea Surface Temperatures

TIMELINESS REQUIREMENTS: TBD

COMMUNICATION REQUIREMENTS: TBD

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: Could have major effects on operations if Fast Delivery SST's are required.

ADDITIONAL COMMENTS: Barton will organize and conduct these field experiments. Very little other information is now available.

FIELD EXPERIMENT FACTSHEET (O17V)

FIELD EXPERIMENT NAME: ARGOS Drifting Buoy SST Observations (O17V)

PURPOSE: Validation of MODIS-N SST measurements.

PROPOSER: Dr. Otis B. Brown

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Oceans/physical

GROUND-TRUTH INSTRUMENTS USED: ARGOS Buoys

LOCATION(S): Global (?)

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: MODIS-N SST's

TIMELINESS REQUIREMENTS: Near-real-time (?)

COMMUNICATION REQUIREMENTS: Data is generated by NOAA/NMC or NOS. A Global Telecommunications System (GTS) access at Miami, Florida is required.

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: If the buoy data is not used in the routine generation of standard data products, then there is no major impact. The buoy data may be put in a special format for the DADS which could be computationally intensive.

ADDITIONAL COMMENTS:

FIELD EXPERIMENT FACTSHEET (O18V)

FIELD EXPERIMENT NAME: Ship of Opportunity SST Observations (O18V)

PURPOSE: Validation of MODIS-N SST measurements.

PROPOSERS: Dr. Otis B. Brown; Dr. Kendall L. Carder

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Oceans/physical

GROUND-TRUTH INSTRUMENTS USED: Ships of Opportunity

LOCATION(S): Global (?)

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: MODIS-N SST's

TIMELINESS REQUIREMENTS: Near-real-time (?)

COMMUNICATION REQUIREMENTS:
1) Data is generated by NOAA/NODC or NOAA/NCC or NOAA/NMC. A Global Telecommunications System (GTS) access at Miami, Florida is required for Dr. Brown.
2) The same data sets must be made available at St. Petersburg, Florida for Dr. Carder.

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; will these data sets be duplicated in the DADS?

ADDITIONAL COMMENTS: Dr. Carder also mentions MODIS team cruises, but no details are given.

FIELD EXPERIMENT FACTSHEET (O19V)

FIELD EXPERIMENT NAME: Optical Buoy Experiment (O19V)

PURPOSE: Provide MODIS team members with a large number of in-situ ground truth measurements of ocean parameters for validation of their data products.

PROPOSER: Dr. Dennis K. Clark

PRE-LAUNCH OR POST-LAUNCH(?): Both

SCIENTIFIC DISCIPLINE(S): Oceans/biological/physical

GROUND-TRUTH INSTRUMENTS USED:
1) Optical Buoy Network
2) Satellite Data Telemetry Link

LOCATION(S): TBD

TIME(S): Always on, once deployed.

MODIS DATA PRODUCTS REQUIRED: Most MODIS ocean data products can be compared to the optical buoy data.

TIMELINESS REQUIREMENTS: Near-real-time (?)

COMMUNICATION REQUIREMENTS: Satellite data telemetry link will be developed. Implies data will enter EosDIS data stream and be available at the CDHF for near-real-time validation of ocean data products.

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: CDHF needs to be prepared for the receipt and use of optical buoy data; DADS will need a standard format for this data set since it could be used by many team members.

ADDITIONAL COMMENTS:

Potential ground-truth data products are: 1) downwelled spectral irradiance, 2) Upwelled spectral irradiance, 3) water leaving spectral radiances, 4) diffuse attenuation coefficients, 5) photosynthetic active radiation, 6) fluorescence line height, 7) spectral reflectance (or radiance) factor, 8) phytoplankton pigment concentrations, 9) total suspended matter concentration, 10) FLH chlorophyll a concentration, 11) fluorescence quantum efficiency, 12) phaeopigment a concentrations, and 13) primary production.

Dr. Evans expressed a need for this data.

FIELD EXPERIMENT FACTSHEET (O20V)

FIELD EXPERIMENT NAME: Australian Waters Ground-truth Data (O20V)

PURPOSE: Routinely provide in-situ water measurements near Australia and compare them to the MODIS-T derived values.

PROPOSER: Dr. John S. Parslow

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Oceans/biological

GROUND-TRUTH INSTRUMENTS USED:

1) Airborne Ocean Color Sensor (OCS)
2) Water leaving radiance spectra.
3) Suite of biological, chemical, and physical properties at the monitoring station near Hobart.

LOCATION(S): Hobart and regions around Australia

TIME(S): TBD (weekly measurements are made at Hobart)

MODIS DATA PRODUCTS REQUIRED:

1) Water Leaving Radiances
2) Ocean Color
3) Chlorophyll Pigment Concentration
4) Other TBD Pigment Concentrations
5) Sea Surface Temperature (?)
6) Other TBD parameters

TIMELINESS REQUIREMENTS: None

COMMUNICATION REQUIREMENTS: CDHF data products sent to Hobart on EXABYTE, CCT, or 6250 bpi tape. May be delivered by DADS.

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data set to DADS.

ADDITIONAL COMMENTS:

FIELD EXPERIMENT FACTSHEET (O21V)

FIELD EXPERIMENT NAME: NASA Airborne Oceanographic Lidar (AOL) Experiment (O21V)

PURPOSE: Use NASA AOL to derive pigment concentrations in the mid-Atlantic Bight and compare to MODIS derived values of the same quantities.

PROPOSER: Dr. Frank E. Hoge

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Oceans/biological

GROUND-TRUTH INSTRUMENTS USED: NASA AOL

LOCATION(S): Mid-Atlantic Bight

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED:

1) Chlorophyll Pigment Concentration
2) Phycoerythrin Pigment Concentration
3) Phycocyanin Pigment Concentration
4) Species Diversity

TIMELINESS REQUIREMENTS: TBD (probably require routinely generated MODIS data products).

COMMUNICATION REQUIREMENTS: None

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:

FIELD EXPERIMENT FACTSHEET (O22V)

FIELD EXPERIMENT NAME: U.S Global Ocean Flux Study (GOFS) and JGOFS Survey (O22V)

PURPOSE: In-situ data in a proposed field experiment will be used to validate MODIS-T and MODIS-N ocean primary productivity values.

PROPOSER: Dr. Wayne E. Esaias; Dr. Mark R. Abbott

PRE-LAUNCH OR POST-LAUNCH(?): Post-launch

SCIENTIFIC DISCIPLINE(S): Oceans/biological

GROUND-TRUTH INSTRUMENTS USED: GOFS and JGOFS ship and buoy instruments.

LOCATION(S): TBD

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: Oceanic Primary Productivity

TIMELINESS REQUIREMENTS: TBD (probably no more than 5 to 10 days after acquisition for either data set)

COMMUNICATION REQUIREMENTS: Access by Dr. Esaias to GOFS and JGOFS data is required for validation studies; Dr. Abbott estimates that a few GB's of data are involved.

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; specialized data sets to DADS.

ADDITIONAL COMMENTS:

FIELD EXPERIMENT FACTSHEET

FIELD EXPERIMENT NAME: California Current System Experiment (O23V)

PURPOSE: Provide validation data for MODIS data products such as primary production.

PROPOSER: Dr. Mark R. Abbott

PRE-LAUNCH OR POST-LAUNCH(?): Both

SCIENTIFIC DISCIPLINE(S): Oceans/biological

GROUND-TRUTH INSTRUMENTS USED:
1) Buoys (Lagrangian drifters)
2) Flow cytometers

LOCATION(S): California offshore waters

TIME(S): TBD

MODIS DATA PRODUCTS REQUIRED: TBD

TIMELINESS REQUIREMENTS: TBD

COMMUNICATION REQUIREMENTS: TBD

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS: None apparent; several GB's per year will be sent to DADS as specialized data products.

ADDITIONAL COMMENTS:
Little information is provided on the experiment in the proposal.

FIELD EXPERIMENT FACTSHEET

FIELD EXPERIMENT NAME:

PURPOSE:

PROPOSER:

PRE-LAUNCH OR POST-LAUNCH(?):

SCIENTIFIC DISCIPLINE(S):

GROUND-TRUTH INSTRUMENTS USED:

LOCATION(S):

TIME(S):

MODIS DATA PRODUCTS REQUIRED:

TIMELINESS REQUIREMENTS:

COMMUNICATION REQUIREMENTS:

SPECIAL MODIS-T OPERATION MODE(?): No

IMPACT ON MIDACS:

ADDITIONAL COMMENTS: